NORTH DAKOTA RETIREMENT AND INVESTMENT OFFICE
Teachers' Fund for Retirement
State Investment Board

Segal Consulting

North Dakota Teachers' Fund for Retirement

Actuarial Valuation as of July 1, 2014

October 23, 2014

Presented By:

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Senior Vice President

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Discussion Topics – Valuation and Projections

- Overview of Valuation Process
- Summary of Valuation Highlights
- Membership and Demographics
- Valuation Results and Projections

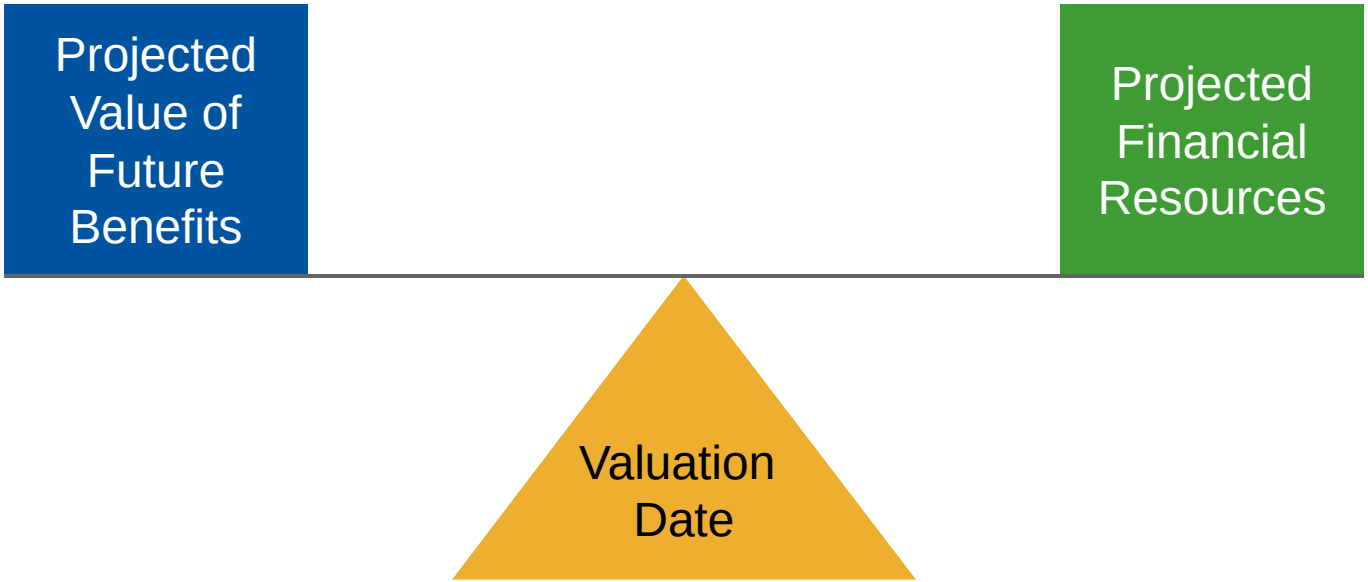
Purposes of the Actuarial Valuation

- Report the Fund's actuarial assets
- Calculate the Fund's liabilities
- Determine the funding policy Actuarially Determined Contribution (ADC) for fiscal year 2015
- Provide information for annual financial statements
- Identify emerging trends

How is an Actuarial Valuation Performed?

- Gather data as of the valuation date
  - Participant data
  - Financial data
- Project a benefit for each member, for each possible benefit
- Apply assumptions about:
  - Economic (investment return, inflation, salary raises)
  - People or demographic (death, disability, retirement, turnover)
- Apply assumptions to benefits to determine a total liability and assign liabilities to service
- Apply the funding policy to determine the actuarially determined contribution (ADC)
  - Based on actuarial cost method and asset valuation method

Actuarial Balance



Over the life of a pension system,

Benefits + Expenses = Contributions + Investment Return

Contributions = Benefits + Expenses - Investment Return

Actuarial Assumptions

Two types:

Demographic	Economic
• Retirement • Disability • Death in active service • Withdrawal • Death after retirement	• Inflation • Interest rate (return on assets) • Salary increases • Payroll growth

Actuaries make assumptions as to when and why a member will leave active service, and estimate the amount and duration of the pension benefits paid.

Economic Assumptions

Interest rate

- 8%, net of all expenses

Salary increase rates

- Based on service
- Ranges from 14.75% for new members to 4.5% for members with 25 or more years of service

Payroll growth

- 3.25%

Actuarial Methods

Asset valuation method (actuarial value of assets)

- Smoothing of investment gains or losses
- TFFR uses a five-year smoothing method
  - Investment returns above or below the expected return are recognized over five years
- 20% market value corridor is applied (e.g., actuarial value must fall within 80% to 120% of market value)

Cost method

- Allocation of liability between past service and future service
  - TFFR uses the entry age normal cost method
  - Most retirement systems use the entry age normal cost method

Amortization method

- 30-year “closed” period to pay off unfunded actuarial accrued liability, effective with the July 1, 2013, actuarial valuation
  - 29 years remaining as of July 1, 2014
- Based on level percentage of payroll

Entry Age Normal Cost Method

Allocates Cost Between Past and Future service

- **Normal Cost:** Cost of annual benefit accrual as a level percent of salary
- **Actuarial Accrued Liability:** Represents accumulated value of past normal costs (or difference between total cost and future normal costs)
- **Unfunded Actuarial Accrued Liability:** Actuarial accrued liability minus actuarial value of assets
- **Actuarially Determined Contribution:**
  - Normal cost plus
  - Amortization payment of unfunded accrued liability over a 29-year closed period as a percent of payroll
    - 30-year closed period began July 1, 2013

Actuarial Accrued Liability and Normal Cost

The **actuarial accrued liability** is the portion of the total liability that is allocated to members' past years of service

➢ Retirees and beneficiaries:

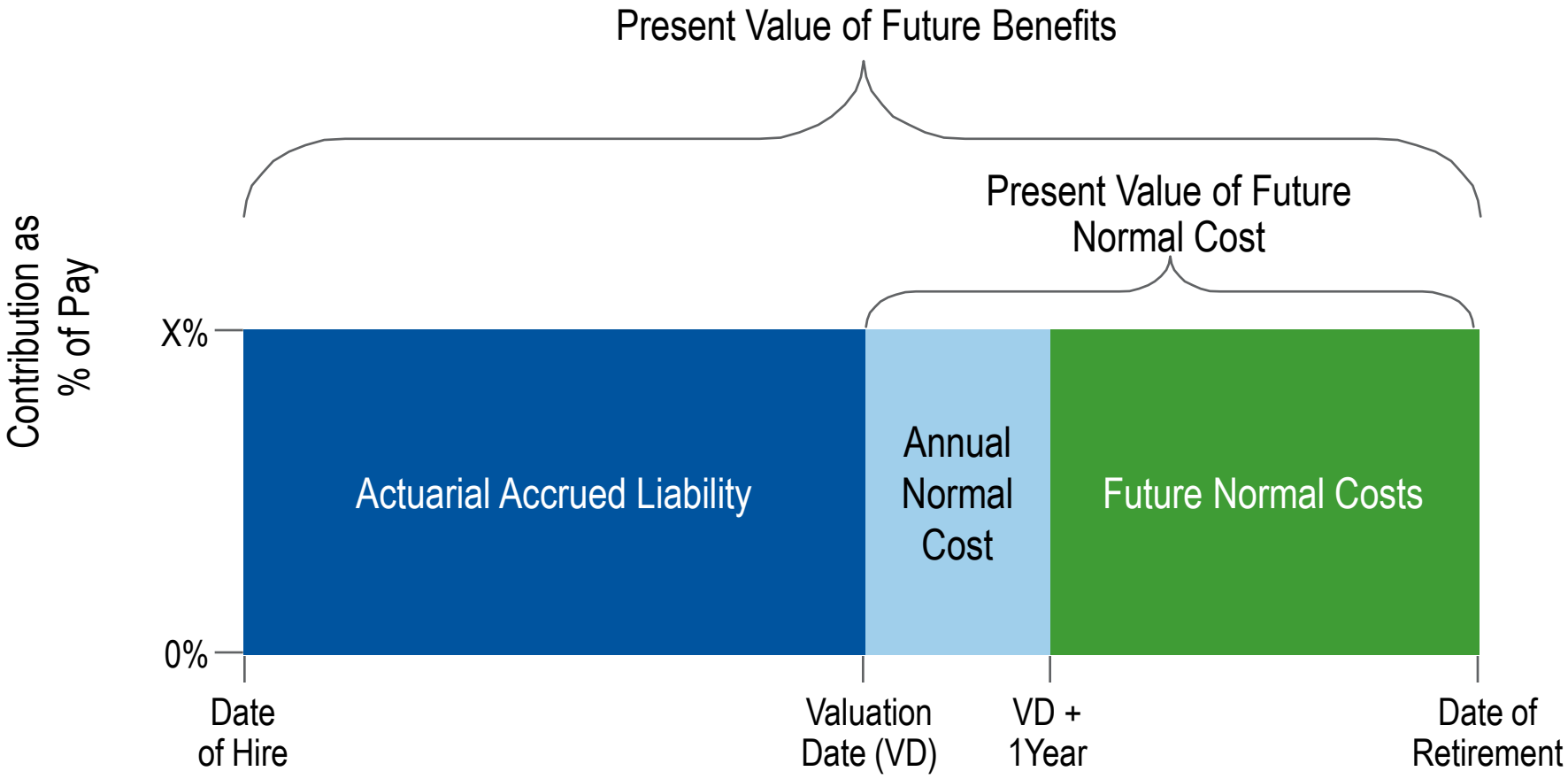
- All years of service are in the past, so the **actuarial accrued liability** is equal to the total liability

➢ Active members:

- The **actuarial accrued liability** represents the portion of the total liability that is attributable to the years of service that the members have already worked
- The **normal cost** represents the anticipated growth in the accrued liability in the coming year

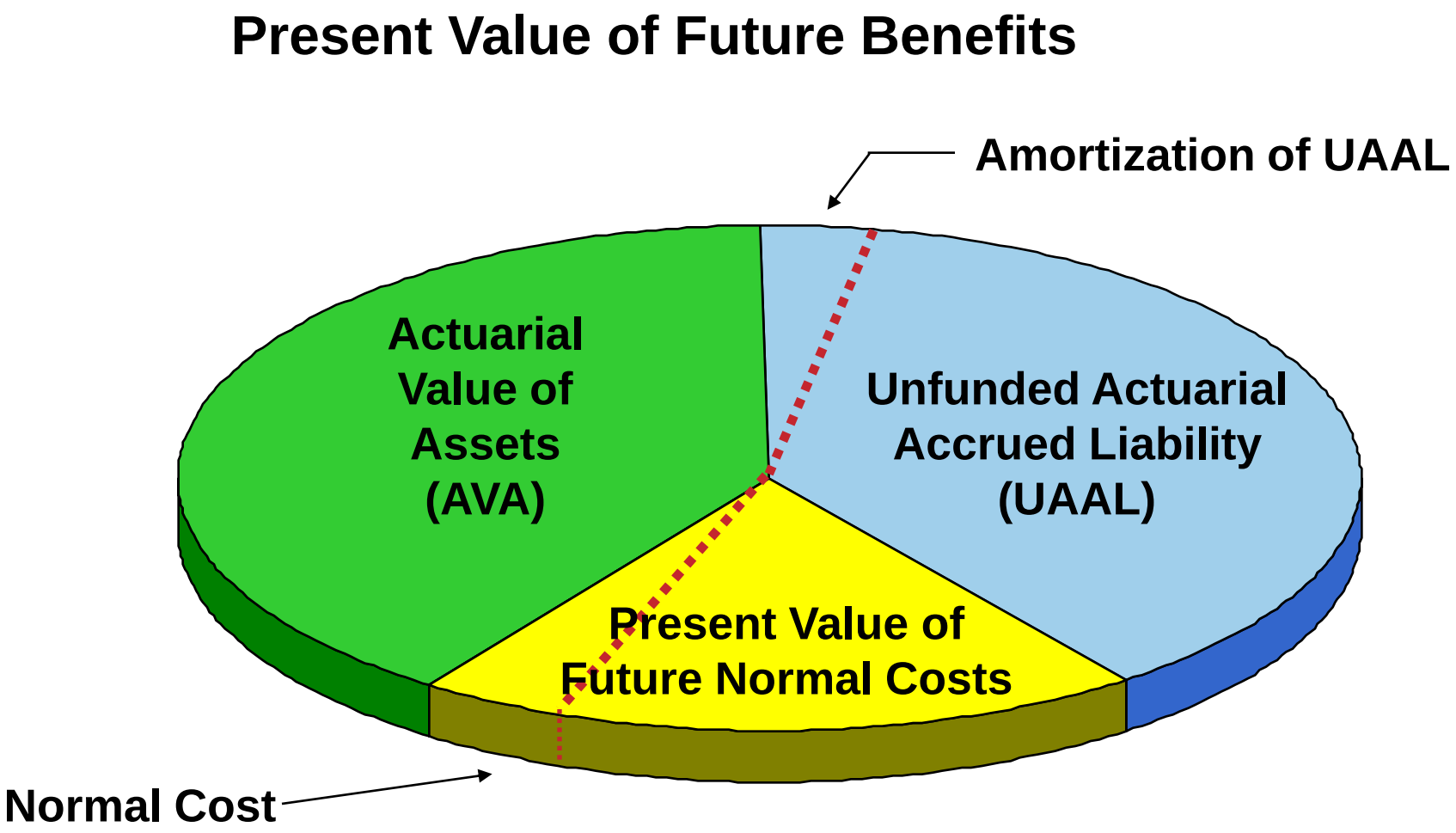
The actuarial accrued liability is compared to the assets as a measure of funding progress.

Funding Process



Actuarial Accrued Liability - Assets = Unfunded Actuarial Accrued Liability

Actuarially Determined Contribution



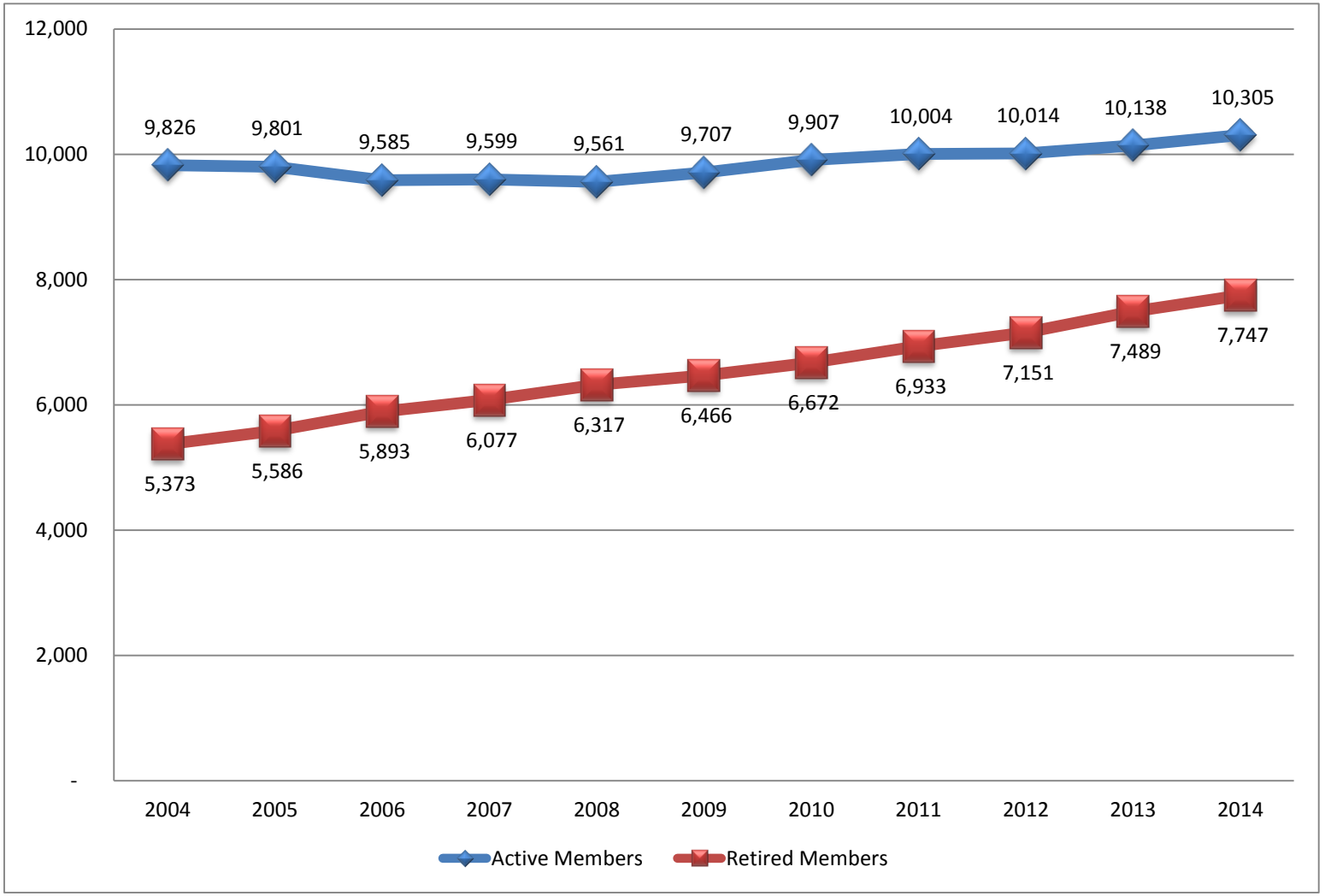
Summary of Valuation Highlights

- Valuation reflects increases in contribution rates contained in HB 1134
  - Member rate increased from 9.75% to 11.75% on July 1, 2014
  - Employer rate increased from 10.75% to 12.75% on July 1, 2014
  - Increases will revert to 7.75% for both members and employers once the funded ratio reaches 100% (measured using the actuarial value of assets)
- Market value of assets returned 16.1% for year ending 6/30/14 (Segal calculation)
  - Gradual recognition of deferred gains resulted in 12.6% return on actuarial value of assets
- Net impact on funded ratio was an increase from 58.8% (as of 7/1/2013) to 61.8% (as of 7/1/2014)
- Effective amortization period decreased from 28 years (as of 7/1/2013) to 24 years (as of 7/1/2014)
- Net impact on actuarially determined contribution (ADC) was an increase from 10.26% of payroll (FY14) to 11.57% of payroll (FY15)
  - The 10.26% ADC from FY14 reflected the present value of the 4% total increase in contributions effective July 1, 2014, and was compared to the 10.75% employer rate for a contribution sufficiency of 0.49% of payroll
  - Based on the employer contribution rate of 12.75% for FY15, the contribution sufficiency has increased to 1.18% of payroll

Membership

	2014	2013	Change
Active:			
• Number	10,305	10,138	+1.6%
• Payroll (annualized)	$557.2 mil	$526.7 mil	+5.8%
• Average Age	42.9 years	43.2 years	- 0.3 years
• Average Service	12.8 years	13.2 years	- 0.4 years
Retirees and Beneficiaries			
• Number	7,747	7,489	+3.4%
• Total Annual Benefits	$165.8 mil	$154.8 mil	+7.1%
• Average Monthly Benefit	$1,783	$1,722	+3.5%

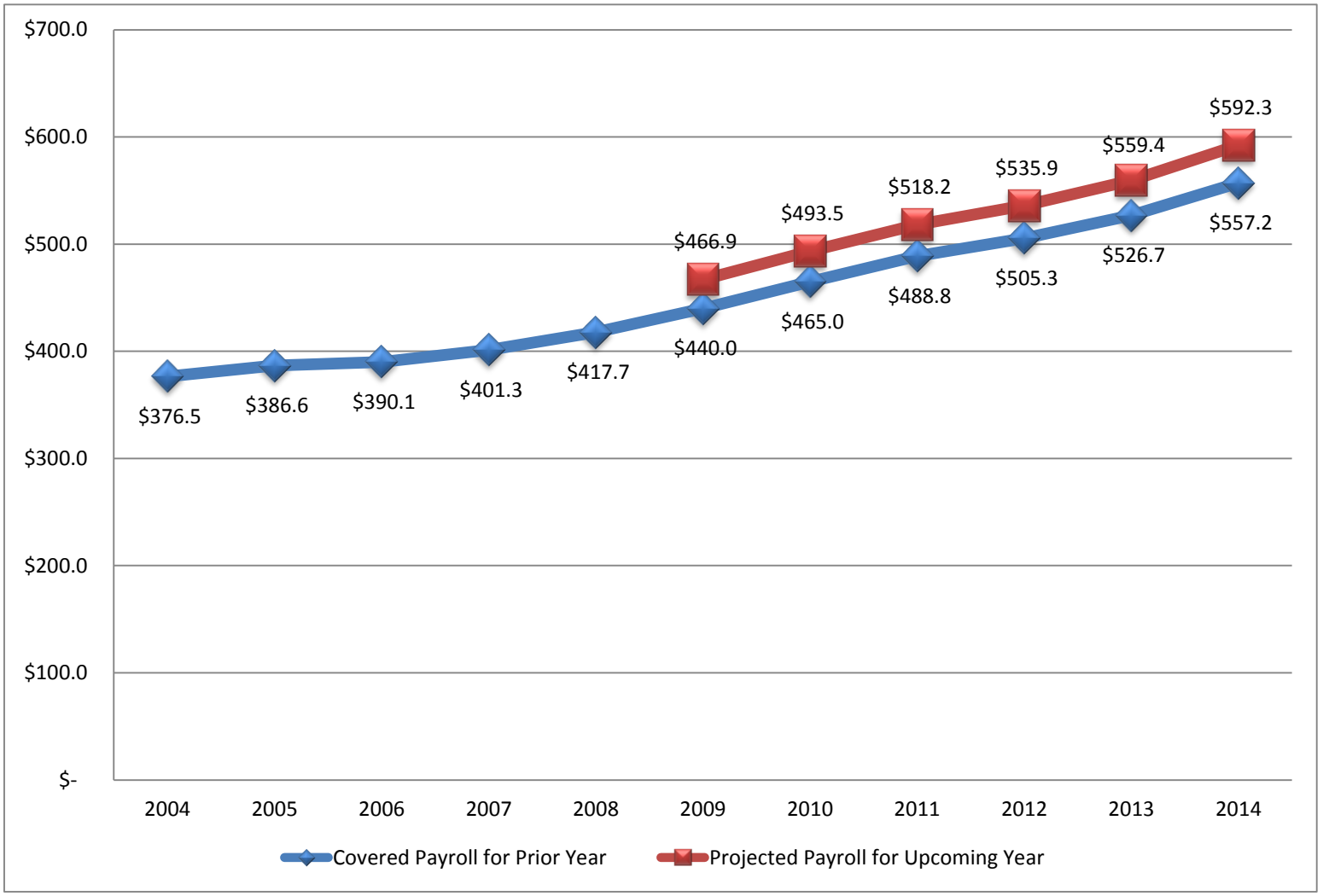
Active and Retired Membership



Since 2004, number of retirees and beneficiaries has increased 3.7% per year on average.

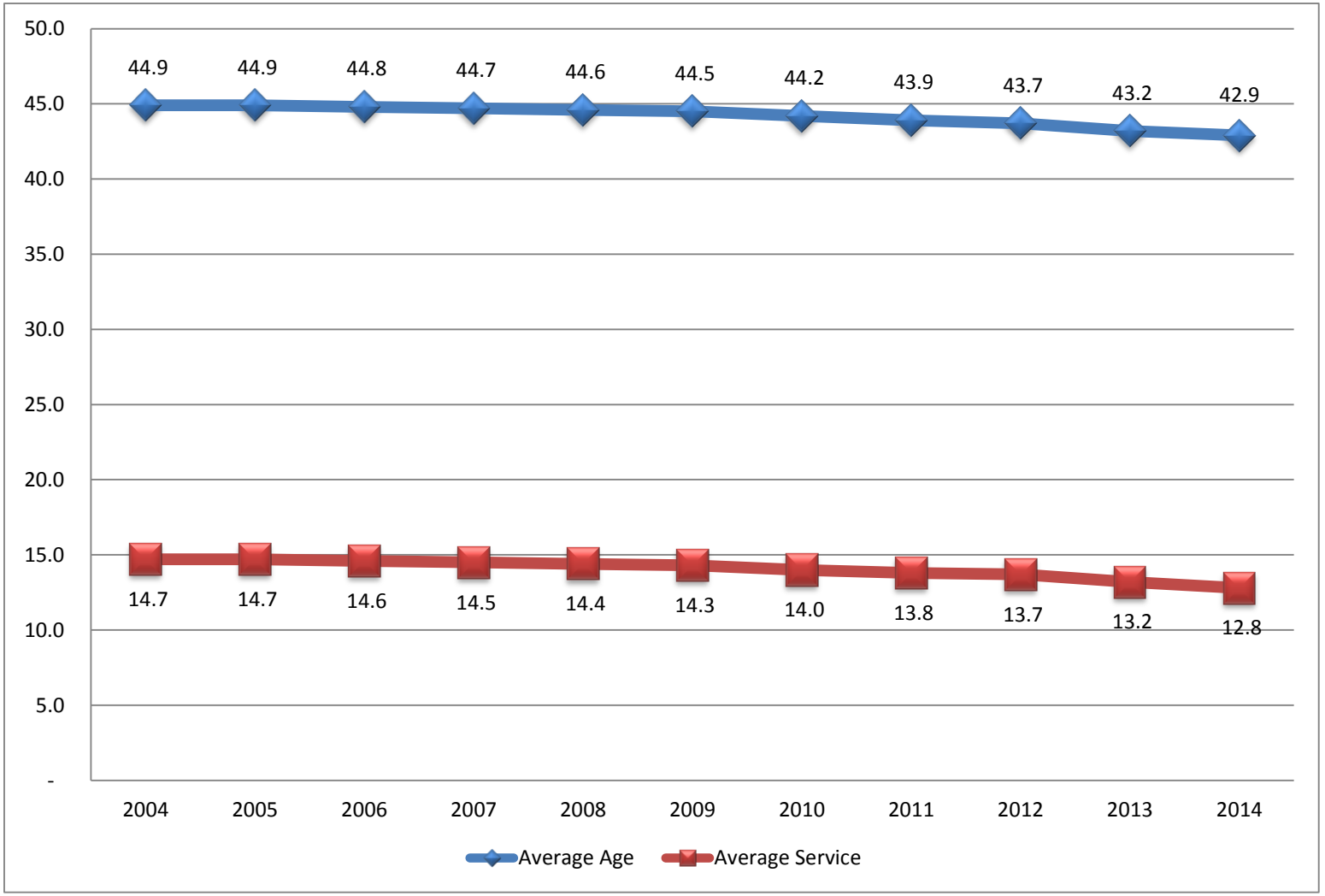
Active Payroll

$ Millions

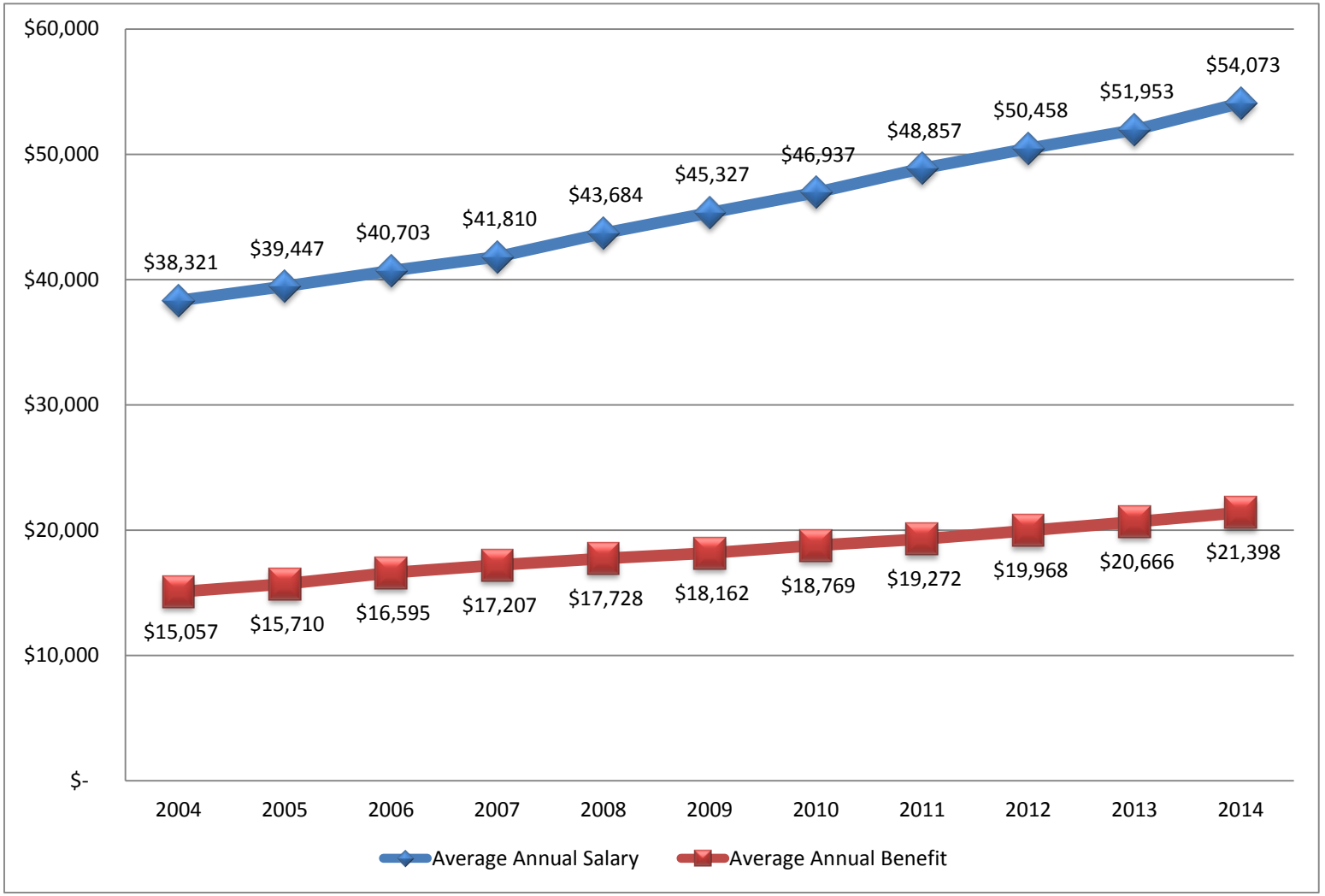


Since 2004, active payroll has increased, on average, 4.0% per year.

Average Age and Service of Active Members



Average Salary and Average Benefit



Since 2004, average salary has increased, on average, 3.5% per year. Average annual benefit has also increased by 3.6% per year.

Assets

- The market value of assets increased from $1.839 billion (as of June 30, 2013) to $2.091 billion (as of June 30, 2014)
  - Segal determined the investment return was 16.1%, net of investment and administrative expenses
- The actuarial value of assets – which smoothes investment gains and losses over five years – increased from $1.762 billion (as of June 30, 2013) to $1.940 billion (as of June 30, 2014)
  - Investment return of 12.6%, net of investment and administrative expenses
  - Actuarial value is 92.8% of market
  - There is a total of $151 million of deferred net investment gains that will be recognized in future years
- The average annual return on market assets
  - 10-year average is 6.8%
  - 20-year average is 7.6%
- The average annual return on actuarial assets
  - 10-year average is 5.2%
  - 20-year average is 6.9%

Market Value of Assets ($ in millions)

Fiscal Year Ending June 30, 2014	
Beginning of Year	$1,839
Contributions:	
• Employer	62
• Member	57
• Service Purchases	2
• Total	121
Benefits and Refunds	(162)
Investment Income (net)	293
End of Year	$2,091
Rate of Return	16.1%

Actuarial Value of Assets ($ in millions)

1. Market Value of Assets as of June 30, 2013	$1,839
2. Contributions and Benefits for FYE June 30, 2014	(41)
3. Expected Return	146
4. Expected Market Value of Assets (1) + (2) + (3)	$1,944
5. Actual Market Value of Assets on June 30, 2014	**2,091**
6. Excess/(Shortfall) for FYE June 30, 2014 (5) – (4)	147
Excess/(Shortfall) Returns:	

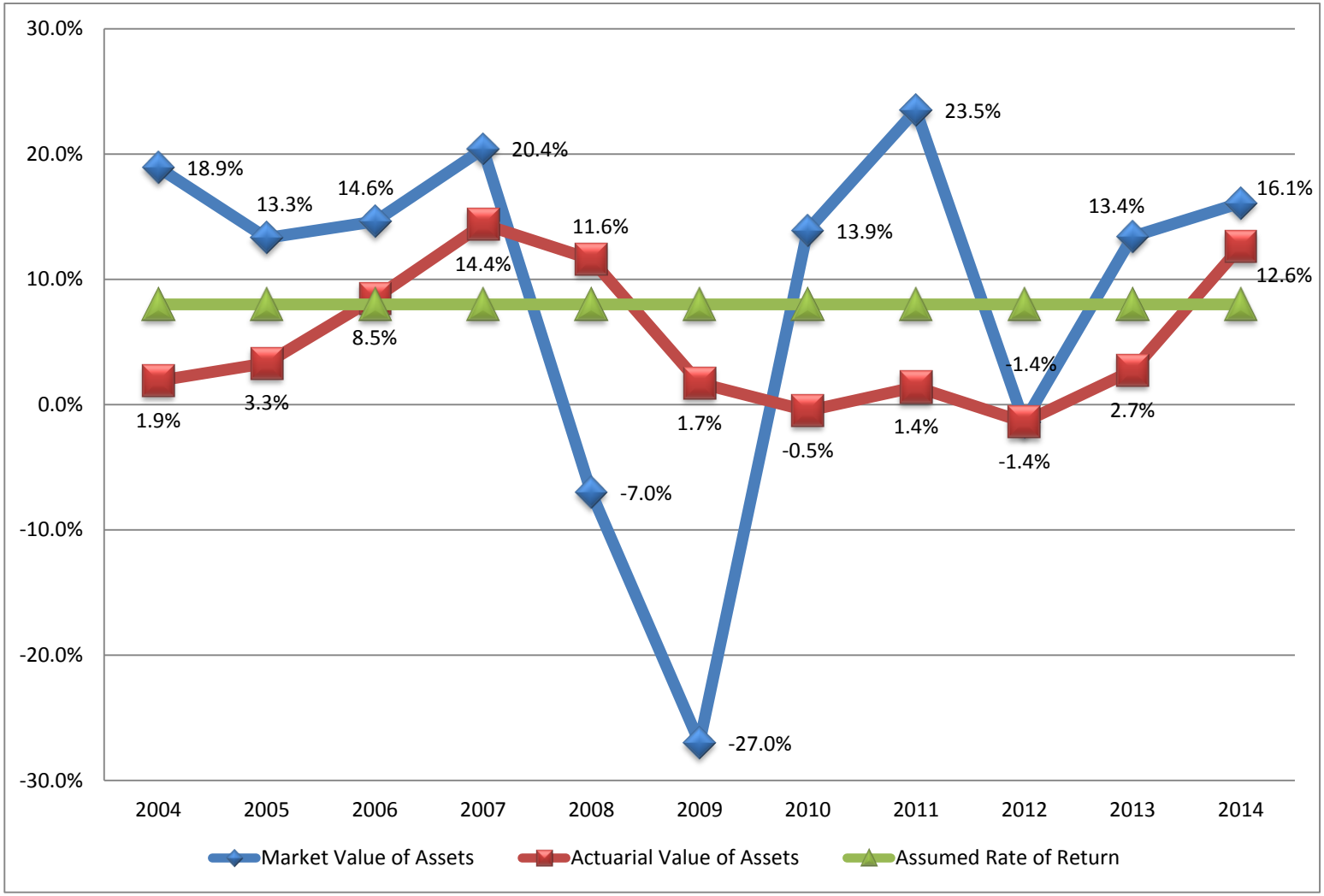
Year	Initial Amount	Deferral %	Unrecognized Amount
2014	$147	80%	$118
2013	87	60%	53
2012	(159)	40%	(64)
2011	220	20%	44
2010	74	0%	0
7. Total			**$151**

8. Actuarial Value of Assets as of June 30, 2014 (5) - (7)	**$1,940**
9. Actuarial Value of Assets as a % of Market Value of Assets	92.8%

Market and Actuarial Values of Assets

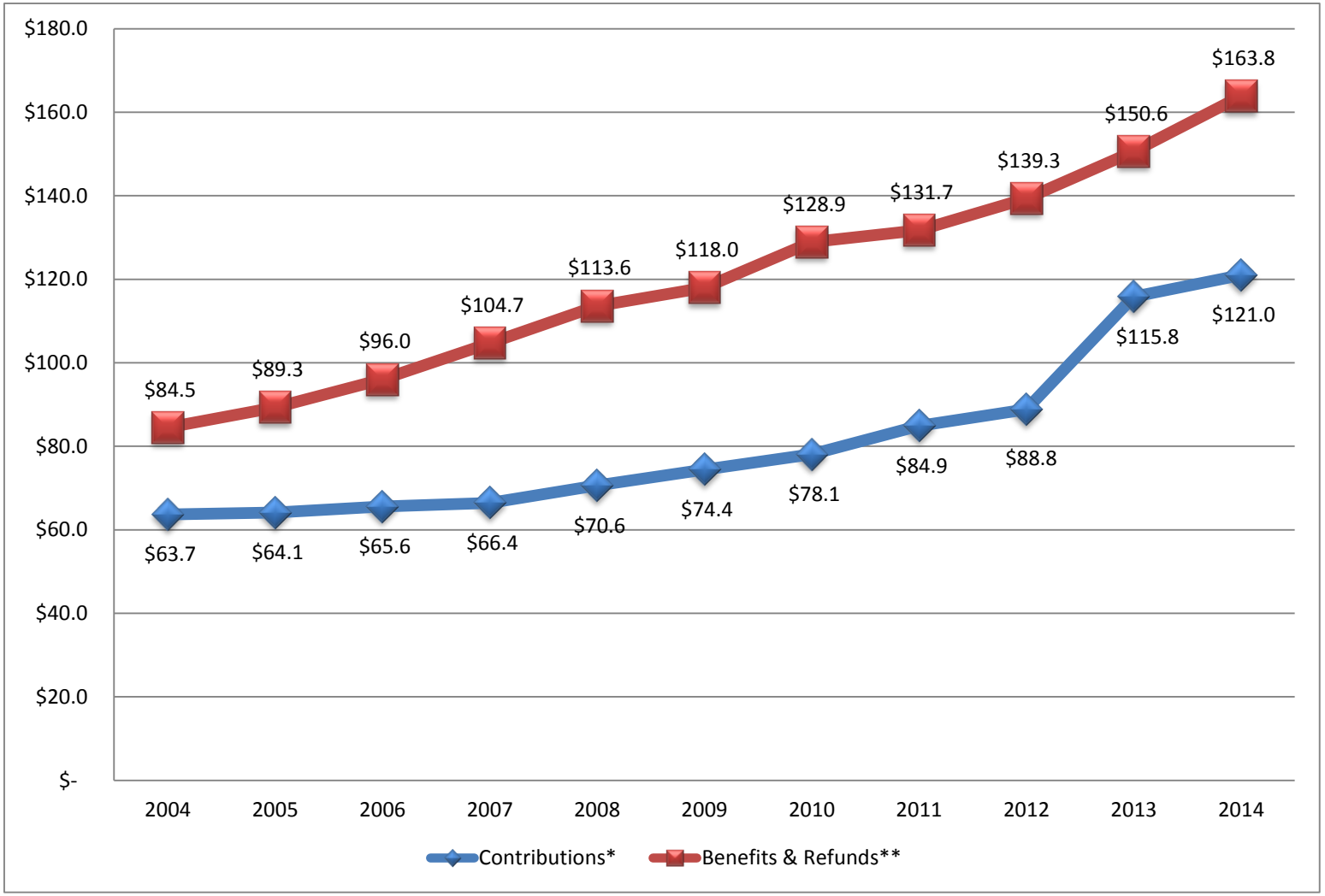
$ Millions

Asset Returns



Contributions vs. Benefits and Refunds

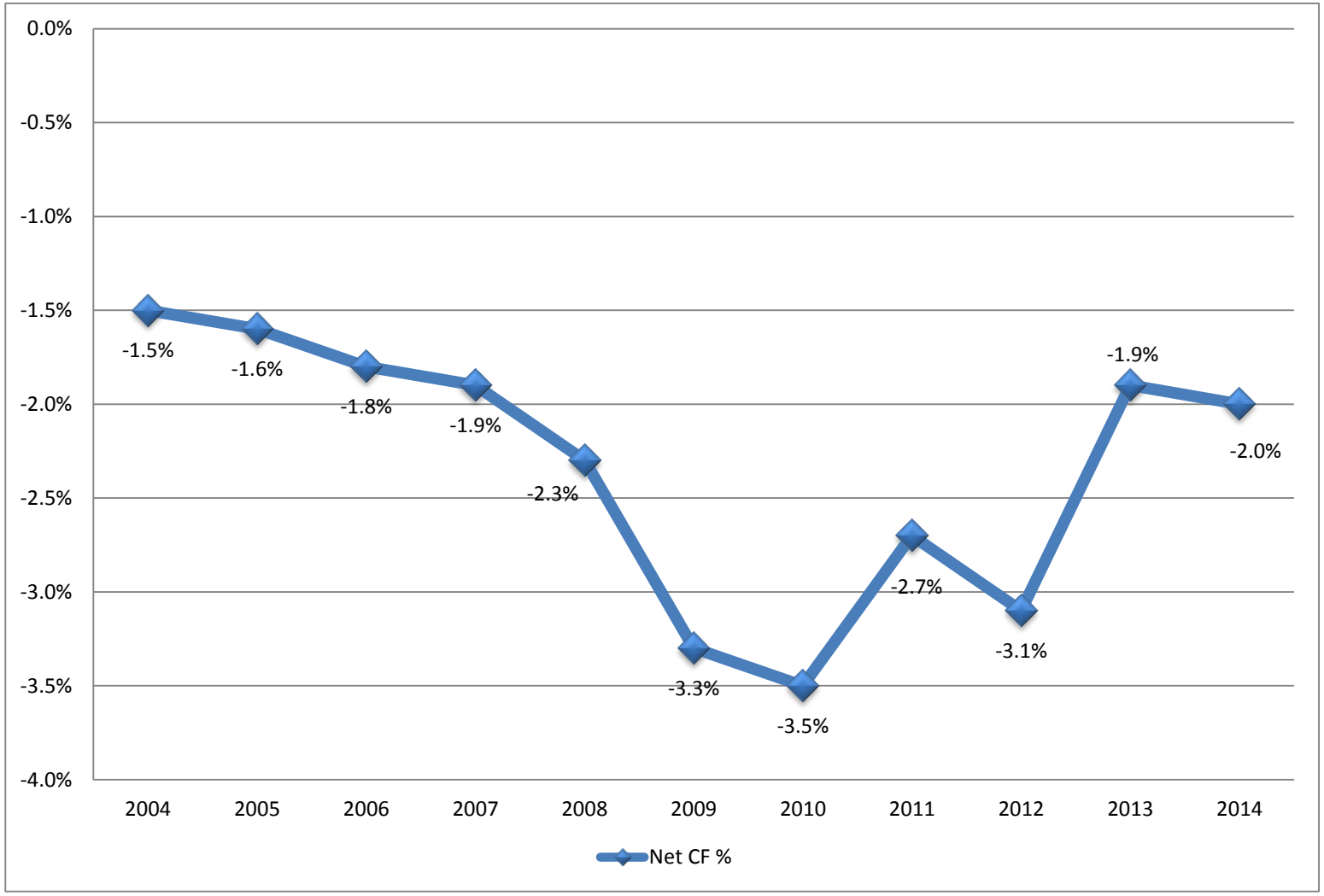
$ Millions



* Includes member and employer contributions, and service purchases

** Includes administrative expenses

Net Cash Flow as a % of Market Value



Valuation Results ($ in millions)

	July 1, 2014	July 1, 2013
Actuarial Accrued Liability:		
• Active Members	$1,398	$1,371
• Inactive Members	79	74
• Retirees and Beneficiaries	1,662	1,552
Total	**$3,139**	**$2,997**
Actuarial Assets	1,940	1,762
Unfunded Accrued Liability	$1,198	$1,235
Funded Ratio	61.8%	58.8%

Actuarially Determined Contribution

	July 1, 2014	July 1, 2013*
Normal Cost Rate	10.63%	10.15%
Member Rate	11.75%	9.75%
Employer Normal Cost Rate	-1.12%	0.40%
Adjusted for Timing	-1.12%	0.41%
Amortization of UAAL*	12.69%	9.85%
Actuarially Determined Contribution	11.57%	10.26%
Employer Rate	12.75%	10.75%
Contribution Sufficiency/(Deficiency)	1.18%	0.49%

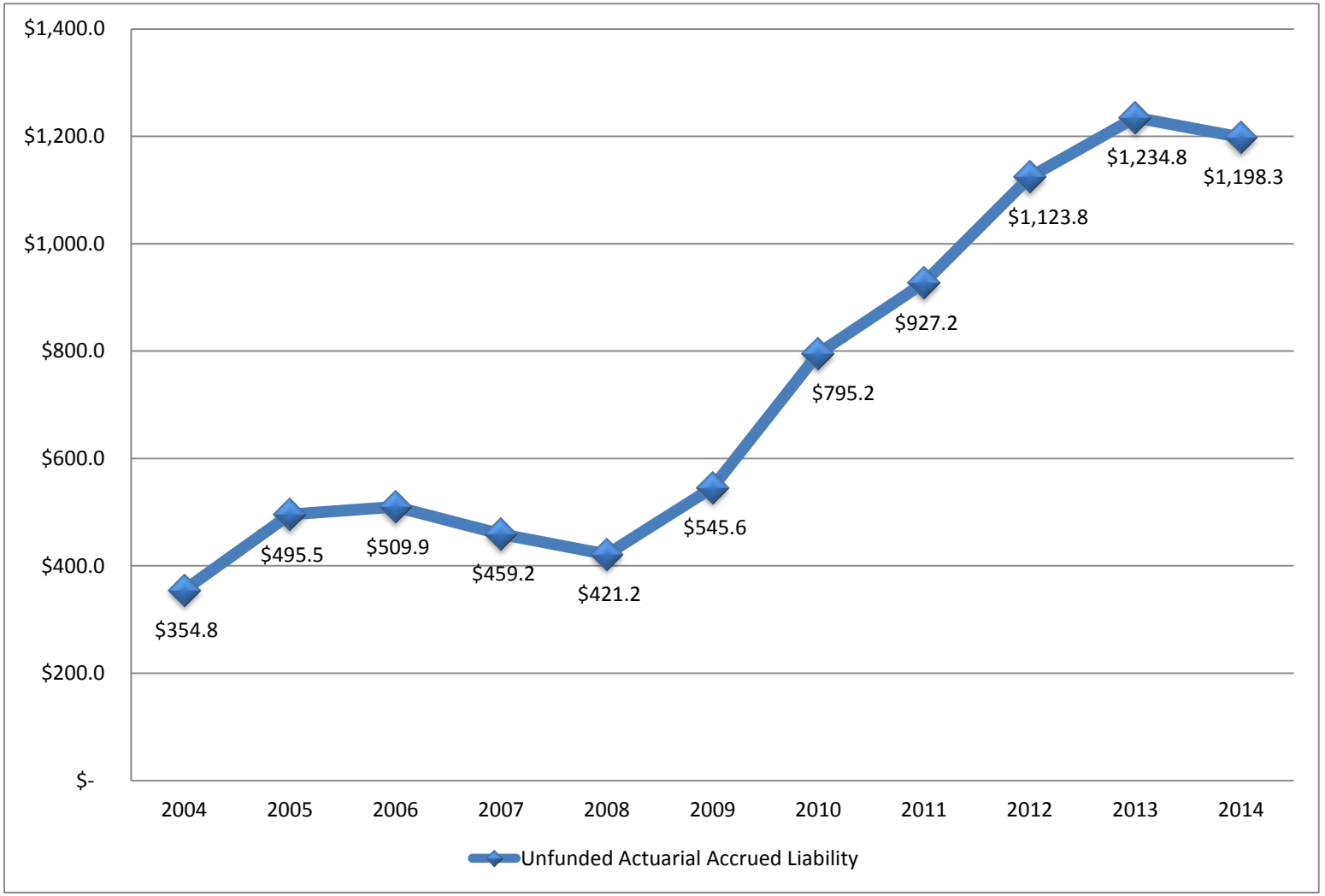
** For July 1, 2013, reflects the actuarial present value of the increased statutory contributions scheduled to occur July 1, 2014.*

Valuation Results - Comments

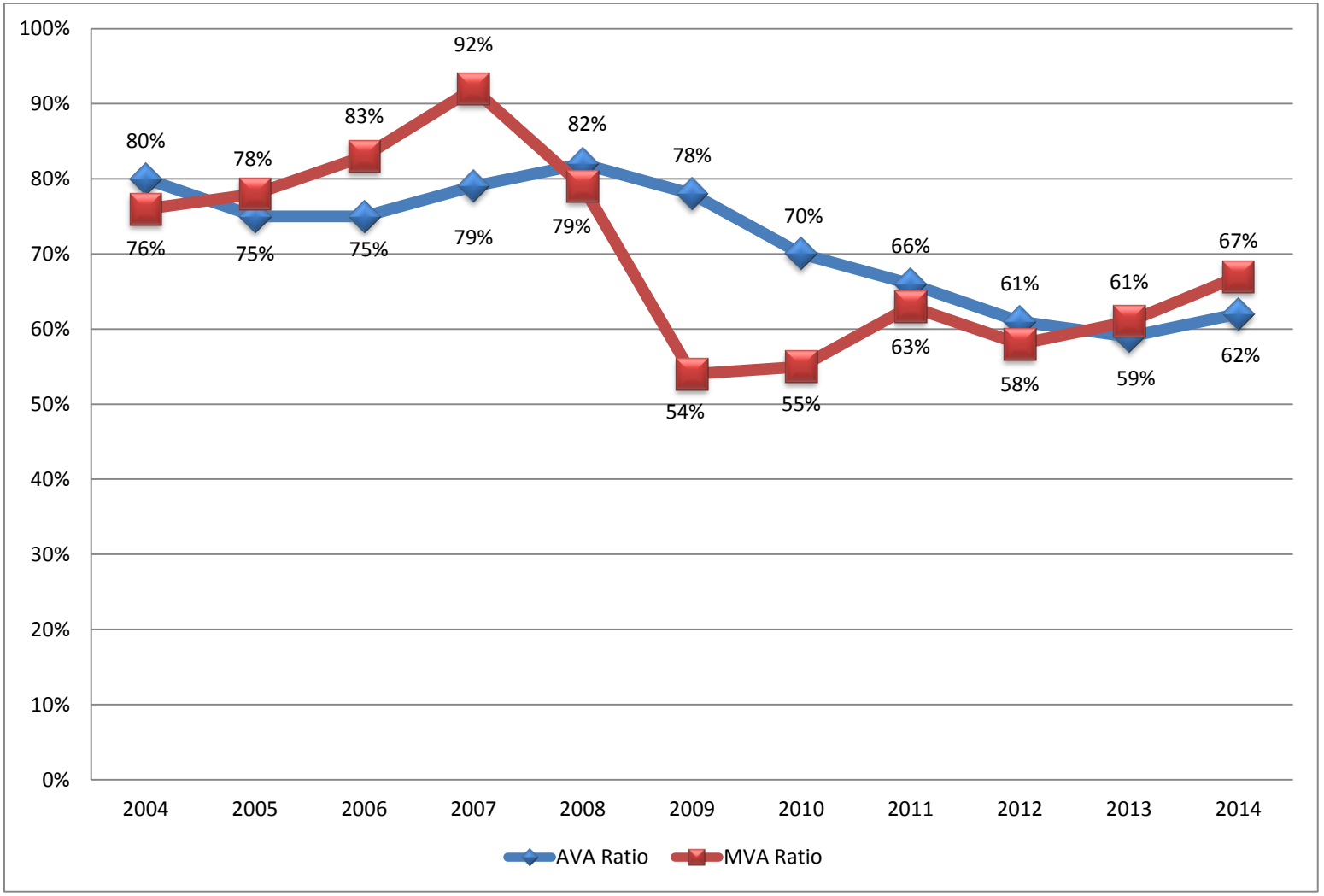
- The actuarial accrued liability increased from $2.997 billion (as of June 30, 2013) to $3.139 billion (as of June 30, 2014)
- The unfunded actuarial accrued liability (UAAL) decreased from $1.235 billion to $1.198 billion
- The funded ratio on an AVA basis increased from 59% to 62%
  - On a market value basis, the funded ratio increased from 61% to 67%
- The actuarially determined contribution (ADC) increased from 10.26% of payroll to 11.57% of payroll
  - This increase was primarily due to removing the adjustment for reflecting the value of the July 1, 2014, contribution rate increases from the ADC calculation
    - For FY15, the increases are now reflected in the employer normal cost and employer contribution rate
  - Compared to 12.75% employer contribution, results in a contribution sufficiency of 1.18%
  - The effective amortization period is 24 years

Unfunded Actuarial Accrued Liability

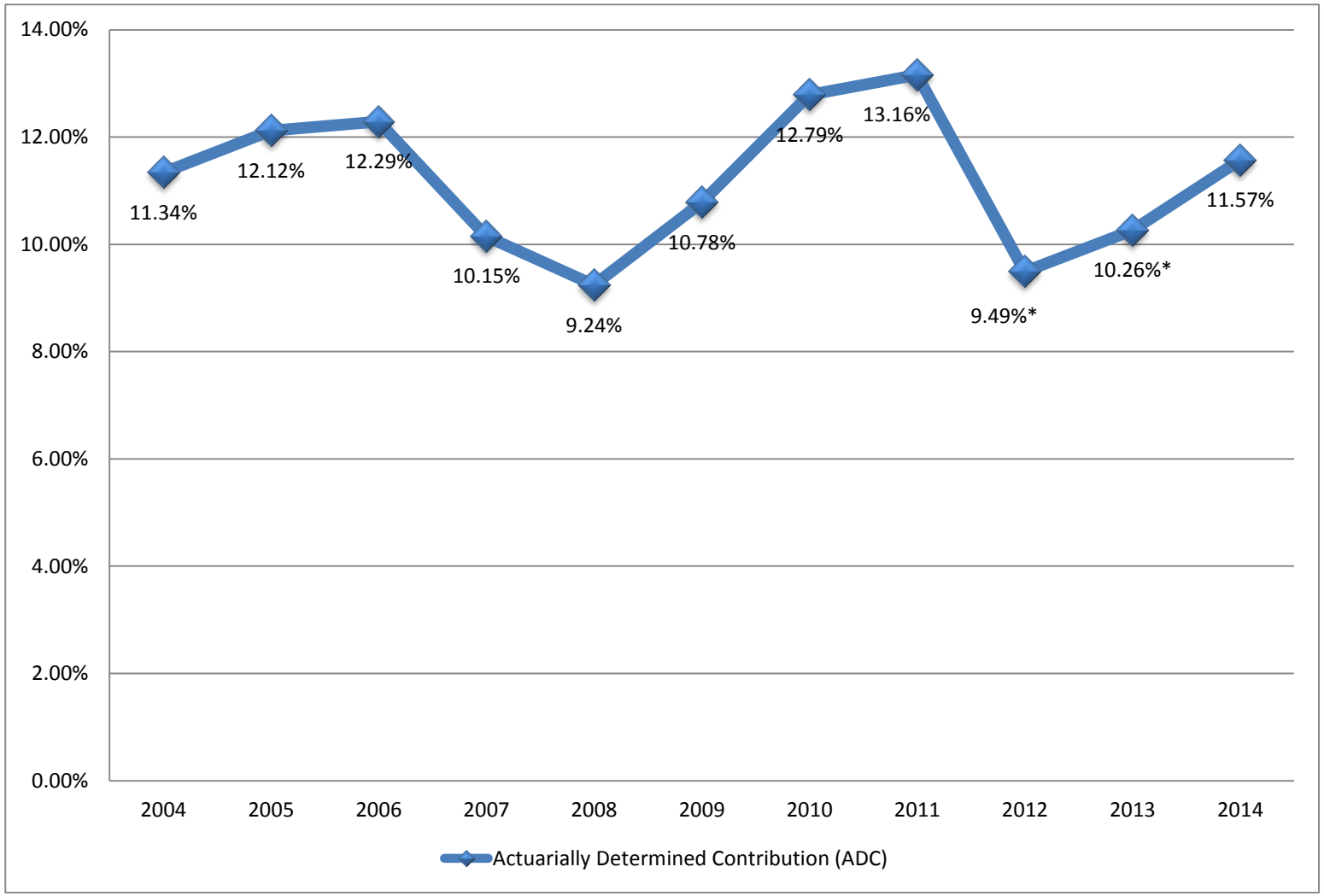
$ Millions



Funded Ratios



Actuarially Determined Contribution (ADC)



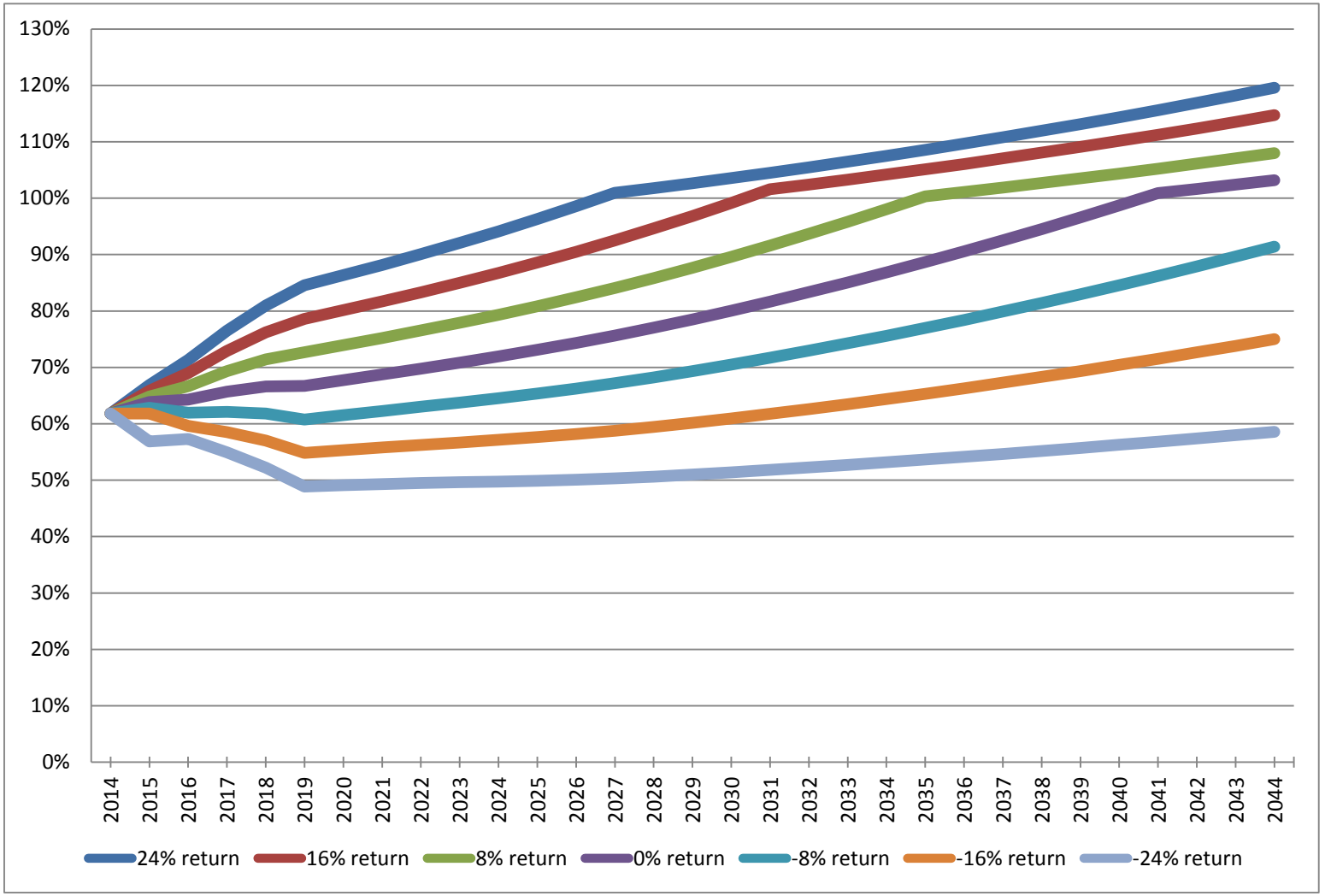
- Prior to 2005, the ADC calculation was based on a 20-year open amortization period.
- From 2005 - 2012, the calculation of the ADC was based on a 30-year open level percentage of payroll amortization.
- Beginning in 2013, the period is 30-year closed.

* Reflects the actuarial present value of contribution increases effective July 1, 2014.

Projections

- Projections of estimated funded ratios for 30 years
  - Based on FY15 investment return scenarios ranging from -24% to +24%
  - Assumes Fund earns 8% per year in FY16 and each year thereafter
  - Additional projections assuming Fund earns 7% or 9% per year every year
  - All other experience is assumed to emerge as expected
- Includes contribution rates from HB 1134
  - Member rate is 11.75% for FY15 and thereafter
  - Employer rate is 12.75% for FY15 and thereafter
  - Increases “sunset” back to 7.75% once the funded ratio reaches 100% (based on actuarial assets)

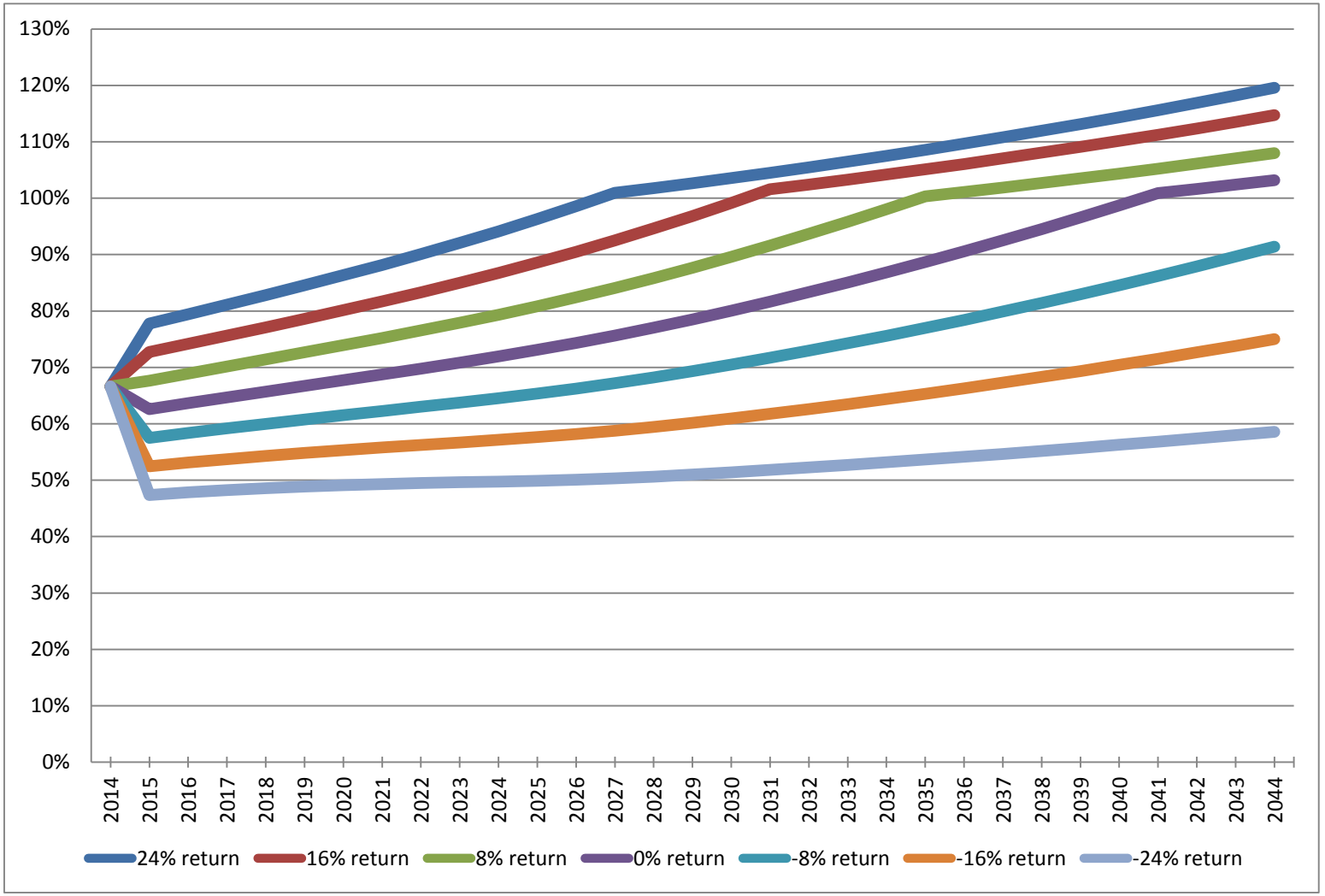
Projected Funded Ratios (AVA Basis)



Projected Funded Ratios (AVA Basis)

Valuation Year	24% for FY2015	16% for FY2015	8% for FY2015	0% for FY2015	-8% for FY2015	-16% for FY2015	-24% for FY2015
2014	62%	62%	62%	62%	62%	62%	62%
2015	67%	66%	65%	64%	63%	62%	57%
2016	71%	69%	67%	64%	62%	60%	57%
2017	77%	73%	69%	66%	62%	59%	55%
2018	81%	76%	71%	67%	62%	57%	52%
2019	85%	79%	73%	67%	61%	55%	49%
2024	94%	87%	79%	72%	65%	57%	50%
2029	103%	97%	88%	79%	69%	60%	51%
2034	108%	104%	98%	87%	76%	64%	53%
2039	113%	109%	104%	97%	83%	69%	56%
2044	120%	115%	108%	103%	91%	75%	59%

Projected Funded Ratios (MVA Basis)



Projected Funded Ratios (MVA Basis)

Valuation Year	24% for FY2015	16% for FY2015	8% for FY2015	0% for FY2015	-8% for FY2015	-16% for FY2015	-24% for FY2015
2014	67%	67%	67%	67%	67%	67%	67%
2015	78%	73%	68%	63%	58%	52%	47%
2016	79%	74%	69%	64%	58%	53%	48%
2017	81%	76%	70%	65%	59%	54%	48%
2018	83%	77%	71%	66%	60%	54%	49%
2019	85%	79%	73%	67%	61%	55%	49%
2024	94%	87%	79%	72%	65%	57%	50%
2029	103%	97%	88%	79%	69%	60%	51%
2034	108%	104%	98%	87%	76%	64%	53%
2039	113%	109%	104%	97%	83%	69%	56%
2044	120%	115%	108%	103%	91%	75%	59%

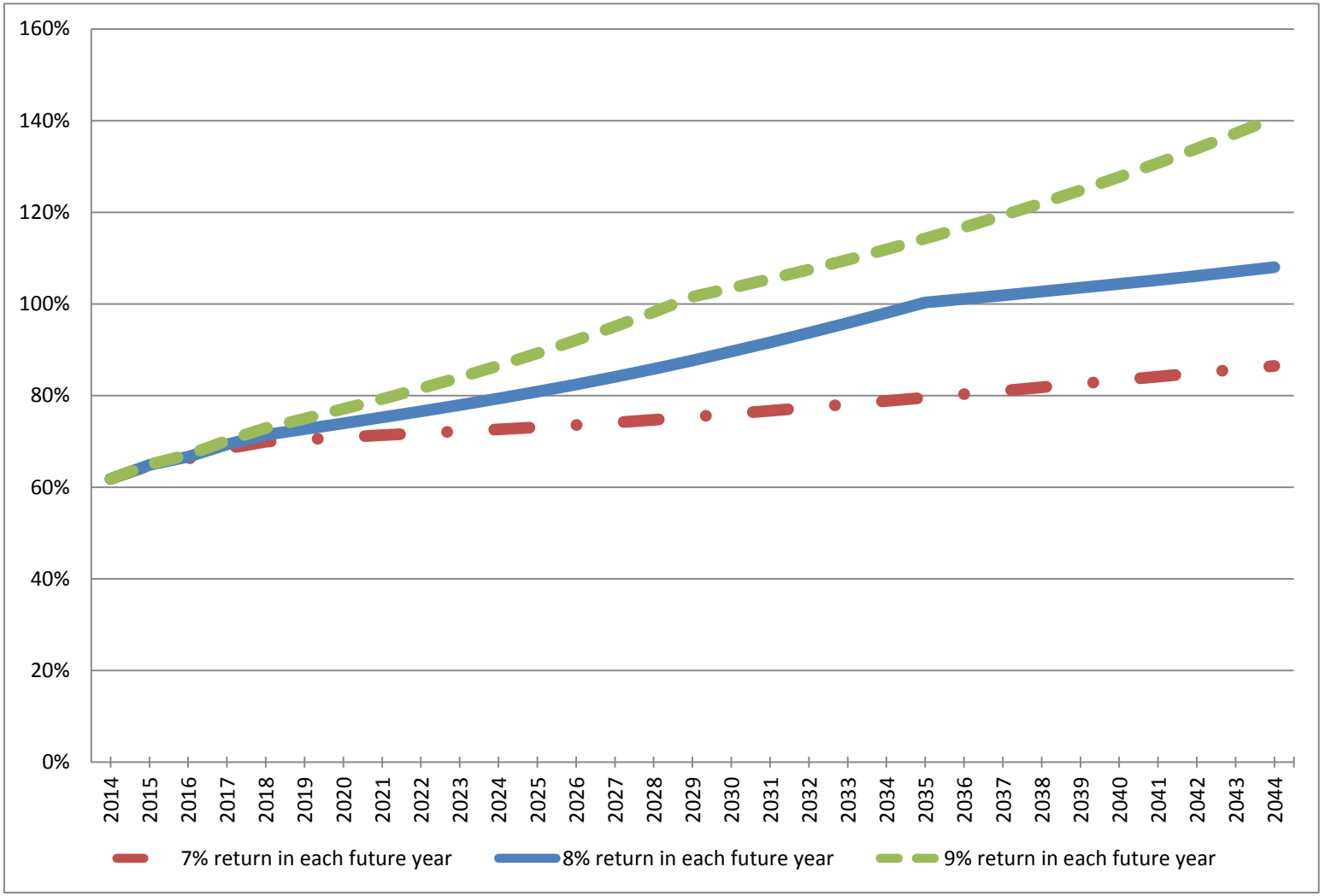
Projected Margin (AVA Basis)

Valuation Year	24% for FY2015	16% for FY2015	8% for FY2015	0% for FY2015	-8% for FY2015	-16% for FY2015	-24% for FY2015
2014	1.18%	1.18%	1.18%	1.18%	1.18%	1.18%	1.18%
2015	2.61%	2.26%	1.91%	1.57%	1.22%	0.87%	-0.82%
2016	3.84%	3.02%	2.20%	1.38%	0.55%	-0.27%	-1.09%
2017	5.41%	4.11%	2.81%	1.52%	0.22%	-1.08%	-2.38%
2018	6.83%	5.05%	3.27%	1.49%	-0.28%	-2.06%	-3.84%
2019	7.98%	5.71%	3.45%	1.18%	-1.08%	-3.34%	-5.61%
2024	11.22%	7.95%	4.69%	1.43%	-1.83%	-5.09%	-8.36%
2029	5.66%	12.07%	7.15%	2.23%	-2.69%	-7.61%	-12.53%
2034	7.26%	6.11%	12.28%	4.35%	-3.59%	-11.52%	-19.45%
2039	9.26%	7.82%	5.82%	11.07%	1.09%	-8.90%	-18.88%
2044	11.85%	10.02%	7.49%	5.67%	6.88%	-5.77%	-18.42%

* The projected margin is based on a 30-year closed period starting July 1, 2013. Once the period declines to 10 years remaining, the projected margin is based on a 10-year open period.

** If an overfunding exists, the surplus is amortized over a 30-year open period.

Projected Funded Ratios (AVA Basis)
Actual Returns +1% or -1% of Assumed



Projected Funded Ratios (AVA Basis)
Actual Returns +1% or -1% of Assumed

Valuation Year	7% Return in Each Future Year	8% Return in Each Future Year	9% Return in Each Future Year
2014	62%	62%	62%
2015	65%	65%	65%
2016	66%	67%	67%
2017	68%	69%	70%
2018	70%	71%	73%
2019	70%	73%	75%
2024	73%	79%	87%
2029	75%	88%	102%
2034	79%	98%	112%
2039	83%	104%	125%
2044	86%	108%	141%

Discussion Topics – GASB 67 and 68

- Overview of New Requirements
- GASB Objectives and Goals
- Requirements for Cost-sharing Plans
- Proportionate Share – Sample

Overview of the New GASB Requirements

- GASB 67 provides for accounting with respect to plans (replaces GASB 25)
  - Effective for TFFR June 30, 2014
- GASB 68 provides for financial reporting by employers (replaces GASB 27)
  - Effective for TFFR participating employers June 30, 2015
- Net pension liability reported on the employer's balance sheet and in the plan's notes to the financial statements
- Accounting and financial reporting divorced from contribution requirements
- Annual pension expense (for employers) is essentially equal to change in net pension liability during the year, with deferrals of certain items

GASB Objectives and Goals

Financial Reporting Focus

- GASB establishes accounting and financial reporting, *not funding policies*
- Focus is on pension obligation, changes in obligation, and attribution of expense

Long-Term Nature of Governments

- Cost of services to long-term operation
- "Interperiod equity" matches current period resources and costs

Employer-Employee Exchange

- Employer incurs an obligation to its employees for pension benefits
- Transaction is in context of a career-long relationship

Net Pension Liability

- Net pension liability (NPL) is required to be reported on the employer's balance sheet
  - Total pension liability (TPL) minus market value of assets
- NPL is calculated using:
  - Projected future benefits
    - Includes projected future service and salary increases
    - Includes the cost of ad hoc COLAs if "substantially automatic"
  - A new blended discount rate
    - Determined using projections of contributions and benefit payments
  - "Entry age" actuarial cost method
    - Most commonly used method
  - Market value of assets
    - Called "Fiduciary Net Position"
    - No actuarial smoothing

Accounting NPL will be more volatile than the current unfunded accrued liability (which will still be used for funding).

New Requirements for Cost-Sharing Plans

- Prior to GASB 68, employers of cost-sharing plans recognized an annual pension expense equal to the statutorily required contribution
  - Pension liabilities ("Net Pension Obligation/Asset" under GASB 27) arose from the difference between contributions required and contributions actually made
  - Employer's UAAL was not reported
- Now under GASB 68, employers will be required to recognize and disclose their proportionate share of the collective pension amounts for all benefits provided by the plan, which include:
  - Net pension liability
  - Deferred outflows of resources
  - Deferred inflows of resources
  - Pension expense

New Requirements for Cost-Sharing Plans *continued*

- When the collective total pension liability (TPL) is greater* than the market value of assets, each employer will need to report its proportionate share of the net pension liability (NPL) in its financial statements
- This is significant because the employer's proportionate share of the collective NPL will appear on the employer's balance sheet
  - Will appear with employer's other long-term liabilities for the first time
  - Not only will NPL be material relative to other liabilities, but it might be the largest long-term liability of the employer
  - Changes in NPL from year to year will be recognized as pension expense, with some deferrals being recognized as deferred outflows/inflows of resources
- Greatly expanded employer disclosures, including:
  - Description of the plan and assumptions
  - Policy for determining contributions
  - Sensitivity analysis of the impact on NPL of changes in liability discount rate
  - Changes in the NPL for the past 10 years
  - Development of long-term earnings assumption

* When TPL is less than the market value of assets, a Net Pension Asset results

Cost-Sharing Plans—Proportionate Share

- Determining an employer's "proportionate share"
  - Basis should be **consistent with the way required contributions are determined**
  - "The use of the projected long-term contribution effort of the employer(s) … is encouraged."
  - If "different contribution rates are assessed based on separate relationships that constitute the net pension liability … the determination of the employer's net pension liability should … reflect those separate relationships."
    - "For example, separate rates are calculated based on an internal allocation of liabilities and assets for different classes or tiers of employees"
- Employer's proportion should be established as of the measurement date
  - Unless employer's proportion is actuarially determined (in which case use date of the actuarial valuation)

TFFR plans to use covered payroll of active members as its basis for allocating the collective NPL.

Net Pension Liability – Collective TFFR

	June 30, 2014	June 30, 2013
Total Pension Liability at 8.00%	$3,138,799,773	$2,997,139,087
Net Plan Position (i.e., MVA)	2,090,977,056	1,839,583,960
Net Pension Liability (NPL)	1,047,822,717	1,157,555,127
Sensitivity to changes in discount rate		
• 1% decrease (7.00%)	$1,414,755,083	$1,511,142,356
• Current discount rate (8.00%)	1,047,822,717	1,157,555,127
• 1% increase (9.00%)	739,221,908	860,669,595

June 30, 2014, Proportionate Share – Sample

	Covered Employee Payroll	Proportionate Share	Allocated NPL
Fargo Public Schools	$63,192,777	10.894306%	$114,153,013
Bismarck Public Schools	61,729,312	10.642008%	111,509,377
West Fargo School	43,479,882	7.495843%	78,543,146
Grand Forks School	41,737,522	7.195464%	75,395,706
Minot School	40,092,868	6.911929%	72,424,762
⋮	⋮	⋮	⋮
Hebron School	1,090,884	0.188066%	1,970,598
Wishek School	1,090,646	0.188025%	1,970,169
⋮	⋮	⋮	⋮
Horse Creek Elementary School	34,500	0.005948%	62,324
Bakker Elementary School	33,500	0.005775%	60,512
Earl Elementary School	30,500	0.005258%	55,095
Grand Totals	$580,053,235	100.000000%	$1,047,822,707*

* Total allocated NPL may not match TFFR NPL due to rounding.

Discussion Topics – Experience Study Planning

- Purpose of an Experience Study
- Economic Assumptions
- Special Considerations for Salary Scale
- Demographic Assumptions

Purpose of an Experience Study

- Each actuarial valuation involves a projection of benefits expected to be paid in the future to all members of TFFR
  - The projection of benefit payments is based on assumptions of future events and conditions
- Assumptions are grouped into two broad categories:
  - Demographic assumptions – primarily selected on the basis of recent experience
  - Economic assumptions – rely more on a long-term outlook of expected future trends
- Gains and losses result from actual experience that differs from expected
  - A pattern of gains or losses with respect to one or more assumptions is the basis for recommended changes to the assumptions
- Actuarial experience studies are undertaken periodically and serve as the basis for recommended changes in actuarial assumptions and methods

Economic Assumptions

- Economic assumptions include:
  - Inflation
  - Salary scale
  - Investment rate of return
  - Payroll growth rate
- "Building block" approach is the common method to develop economic assumptions
  - Inflation is the basis for all economic assumptions
    - Investment rate of return = inflation + expected risk premium for each asset class
    - Salary scale = inflation + productivity + merit increases
    - Payroll growth = inflation + productivity
- Recommended investment return assumption will be based on weighted average "real" returns using TFFR's target asset allocation and capital market assumptions from TFFR's investment consultant
- Payroll growth assumption represents the expected annual increase in total covered payroll from one year to the next
  - Typically determined with respect to a level active population
  - However, North Dakota is experiencing growth in residents and school-aged children, which is expected to lead to additional schools and teachers

Considerations For Salary Increase Assumption

- Salary increase assumption will primarily be based on observations from historical data relative to increases in pay for existing active members over the experience period
  - Data will be analyzed based on age and service to determine the best “fit”
  - Experience data is adjusted for actual inflation to isolate actual increases due to merit and productivity
- We will also analyze “end of career” salary increases
  - Attempt to identify additional increases, if any, that occur for members leading up to retirement
  - May result in additional load factor(s) applied within salary scale assumption or consideration of plan design changes

Demographic Assumptions

- Demographic assumptions should reflect the expected occurrences of various events among participants
  - A reasonable assumption is one that is expected to model the contingency being measured and not expected to produce significant gains or losses
- Actual experience period data is analyzed and compared to expected outcomes based on existing assumptions
  - Ratios of "actual to expected" are generated based on subsets such as age, service, gender, etc.
    - A ratio of 100% means the actual experience was exactly equal to the expected experience
    - Ratios above and below 100% are analyzed to determine whether assumption should be changed
  - Recommended assumptions are formulated to achieve desirable ratios of "actual to proposed"
- Mortality assumption should reflect anticipated improvement in life expectancies and can be accomplished by:
  - Using a static projection
    - E.g., all mortality rates "projected" to 2020
  - Using a generational approach
    - I.e., mortality rates in the following year reflect one year of improvement, rates 20 years from now reflect 20 years of improvement, etc.
    - E.g., the mortality rate at age 65 is less for someone currently age 35 as compared to someone currently age 60

Discussion Topics – DB vs. DC

- Definition of Retirement Plan Risks
- Comparison of DB and DC Plans
- Hybrid Plan Designs
- Examples and Recent Trends

Defined Benefit Versus Defined Contribution

- Under a DB plan, the benefit is defined and the contribution is not
- Under a DC plan, the contribution is defined, but the benefit is not
- Types of plan risks:
  - Investment risk
  - Inflation risk
  - Contribution risk
  - Longevity risk
- In a DB plan, the employer bears these risks
- In a DC plan the employee bears these risks

Definition of Risks

- Investment Risk
  - Rate of return on assets
  - In DB plan, employer bears all the investment risk
  - In DC plan, employee bears all the investment risk
- Inflation risk
  - Cost of living before and after retirement
  - DB plans usually based on final average salary, so employee has limited cost of living risk
  - Common feature in public sector DB plans is to provide some form of post-retirement benefit increase, so employee has some protection against inflation in retirement
- Contribution risk
  - Level and volatility of annual contributions
  - In DB plan, employer bears this risk
  - In DC plan, contributions are a percentage of salary
    - If investment returns are poor, employees may need to make additional contributions
- Longevity risk
  - Outliving retirement assets
  - In DB plan, benefits paid as life annuity, so employer bears all risk
  - In DC plan, benefits based on account balance, so employee bears all risk

Risk and Features of Different Retirement Plan

Employer and Employee Risk of Different Designs

	Defined Benefit										Defined Contribution	
	Flat Dollar		Career Average		Final Average		Hybrid		Lump Sum Options		401(a), 401(k), 403(b)	
	ER	EE	ER	EE	ER	EE	ER	EE	ER	EE	ER	EE
Economic Risks												
Investment Risk	4	1	4	1	4	1	3	2	3	3	0	4
Inflation risk	0	4	1	3	3	2	2	2	2	2	1	3
Contribution Risk	3	1	4	1	4	1	3	1	3	1	1	1
Longevity Risk	4	0	4	0	4	0	3	2	3	4	0	4
Non-Economic Risks												
Accounting Risk	3	0	3	0	3	0	3	0	3	0	0	0
Features												
Rewards older/longer service employees	4		3		3		2		2		1	
Planning Tool	2		2		2		1		1		1	
Hiring Attractiveness	2		2		2		3		3		3	

Risks	Features
0 None	Not applicable
1 Low	Minor importance
2 Somewhat low	Somewhat minor importance
3 Somewhat high	Relatively important
4 High	Very Important

Comparison of DB and DC Plans

Objective	Defined Benefit	Defined Contribution
Funding Certainty	Plan liabilities change based on actuarial assumptions, e.g., future salary increases, investment earnings, employee turnover.	Employer liability is fulfilled annually as contributions are made to employee accounts based on a percentage of payroll.
Predictable Contributions	Annual contributions may vary from year-to-year based upon actuarial assumptions. Rates may be set by statute to increase predictability. (These rates may need to be changed periodically.)	Annual cash expenditures are more predictable as they are based on a set percentage of employee salaries.
Recruitment Tool	Some portability through service credit purchase or return of employee contributions.	Assets are portable.
Reward Career Employees	Benefits are typically based on final year(s) salary, rewarding career employees.	Benefits are based upon accumulated contributions and earnings.
Expenses	Expenses include actuarial valuations, investment fees, and administrative fees. Employer pays these fees.	Employee expenses may be lower than a defined benefit plan because no actuarial valuations are necessary and investment fees are shifted to the employee. Employee education costs may be higher.

Comparison of DB and DC Plans

Objective	Defined Benefit	Defined Contribution
Benefit Potential	Benefits paid at retirement are for life and are guaranteed by the plan's benefit formula.	Benefits paid at retirement are based on contributions and earnings. The final retirement benefit can be eroded by pre-retirement distributions.
Understandable Benefits	Benefits require explanation because they are based on a set of variables, e.g., future earnings and year of service at retirement.	Benefits are based on accumulated contributions plus earnings at the time of retirement. Market fluctuations and life expectancy make it difficult to manage retirement benefit.
Access to Benefits While Employed	Benefits may not be withdrawn while actively employed.	Benefits may be withdrawn or loaned under certain circumstances.

Hybrid Plans

- A Hybrid plan is some combination of the features of a DB plan and the features of a DC plan
- Reasons Hybrid plans are considered:
  - Lower employer costs
  - Reduce employer contribution volatility
  - Provide greater benefit flexibility, especially for short service employees
  - Make the plan more understandable
  - Modify the risk characteristics of the benefit offerings

Hybrid Plan Considerations

- DB and DC plans have very different approaches to benefit design
  - DB plans focus on benefit security
  - DC plans focus on wealth accumulation
- Shifting of plan risks may have unintended consequences
- There is no magic equivalent plan (DB = DC)
  - Difference rests in risk and performance

Menu of Plan Designs

Basic Plan Designs

Defined Benefit

- Final Average Salary
- Career Average Salary
- Flat Benefit Accruals

Defined Contribution

- Traditional DC
- 401(k)
- 403(b)
- 457
- Matching plans

Hybrid Plan Designs

- DB plans with lump sum options
- Combined plans
- Crossover plans
- Cash balance plans

Combined Plan

- Have both defined benefit and defined contribution components
- Attributes:
  - Allocates portion of the plan risk to the member
  - Provides additional benefit flexibility to the member
  - Lowers future contributions for the plan sponsor
  - Maintains a core DB for the base retirement benefit
  - Provides a platform for death and disability benefits
- Variations:
  - Defined benefit is primary plan with defined contribution to enhance portability
  - Defined contribution is primary plan with defined benefit as “safety net” plan
  - ND PERS “PEP” Provision – enhanced return of contribution withdrawal benefits, payable as a lump sum.

Crossover Plan

- Members can choose among defined benefit, defined contribution, or combined plan at hire date
  - Example – Ohio State Teachers Retirement System
- Members have option to “crossover” to another plan after 3 or 5 years
  - In Ohio State Teachers Retirement System, members default to DB plan unless they affirmatively elect another plan

Cash Balance Plan

- Defined benefit plan that looks like a defined contribution plan
- Hypothetical account balance credited with percentage of salary and interest each year
- For example:
  - Annual credit to account balance of 5% of salary
  - Annual interest on account balance equal to 10-year treasury rate plus 1.5%
  - Benefits paid at retirement or termination based on value of hypothetical account balance
- Actual contributions based on annual valuation and expected to be less than annual credit plus interest

Examples of Public Sector Hybrid Plans

Combined Plans	Cash Balance
Washington • Employee choice of: – Plan 2: DB–2% of pay plan – Plan 3: » DB–1% of pay plan » DC Employer contribution: 8% Employee contribution: 5% – 15% **Oregon** • Combined DB/DC plan • Tier II: – DB 1.5% of pay plan employer funded – DC 6% employee funded **Utah** (July 2011) Employee Choice of: • Tier II: – DB 1.5% of pay plan – 10% cap on employer contributions • DC funded by "excess" employer contributions OR • DC 10% employer contributions	**Nebraska** (January 1, 2003) • Employees contribution: 4.8% • Employer contribution: 7.5% • Investment return guarantee: – At least 5% annual return – Potential for additional Board approved amount – Total not to exceed 8%

Transition Issues

Changing from a defined benefit to a defined contribution plan results in transition issues that must be addressed

- Unfunded liabilities could remain and may be amortized over a shorter period, driving up short-term costs
- If DC plan is participant-directed, employee education is needed
- Creating a new “tier” adds administrative complexity
- Allowing choice between plans introduces anti-selection issues
- Death and disability benefits cannot be provided by a DC plan
- Workforce management is difficult with DC plan

Glossary

Actuarial Accrued Liability For Actives: The equivalent of the accumulated normal costs allocated to the years before the valuation date.

Actuarial Accrued Liability For Pensioners: The single-sum value of lifetime benefits to existing pensioners. This sum takes account of life expectancies appropriate to the ages of the pensioners and the interest that the sum is expected to earn before it is entirely paid out in benefits.

Actuarial Cost Method: A procedure allocating the Actuarial Present Value of Future Benefits to various time periods; a method used to determine the Normal Cost and the Actuarial Accrued Liability that are used to determine the Actuarially Determined Contribution.

Actuarial Gain or Actuarial Loss: A measure of the difference between actual experience and that expected based upon a set of Actuarial Assumptions, during the period between two Actuarial Valuation dates. Through the actuarial assumptions, rates of decrements, rates of salary increases, and rates of fund earnings have been forecasted. To the extent that actual experience differs from that assumed, Actuarial Accrued Liabilities emerge which may be the same as forecasted, or may be larger or smaller than projected. Actuarial gains are due to favorable experience, e.g., The plan's assets earn more than projected, salary increases are less than assumed, members retire later than assumed, etc. Favorable experience means actual results produce actuarial liabilities not as large as projected by the actuarial assumptions. On the other hand, actuarial losses are the result of unfavorable experience, i.e., actual results yield in actuarial liabilities that are larger than projected. Actuarial gains will shorten the time required for funding of the actuarial balance sheet deficiency while actuarial losses will lengthen the funding period

Actuarially Equivalent: Of equal actuarial present value, determined as of a given date and based on a given set of Actuarial Assumptions.

Actuarial Present Value (APV): The value of an amount or series of amounts payable or receivable at various times, determined as of a given date by the application of a particular set of Actuarial Assumptions. Each such amount or series of amounts is adjusted for the probable financial effect of certain intervening events (such as changes in compensation levels, marital status, etc.), multiplied by the probability of the occurrence of an event (such as survival, death, disability, termination of employment, etc.) on which the payment is conditioned, and discounted according to an assumed rate (or rates) of return to reflect the time value of money.

Glossary

Actuarial Present Value of Future Plan Benefits: The Actuarial Present Value of benefit amounts expected to be paid at various future times under a particular set of Actuarial Assumptions, taking into account such items as the effect of advancement in age, anticipated future compensation, and future service credits. The Actuarial Present Value of Future Plan Benefits includes the liabilities for active members, retired members, beneficiaries receiving benefits, and inactive members entitled to either a refund or a future retirement benefit. Expressed another way, it is the value that would have to be invested on the valuation date so that the amount invested plus investment earnings would be provide sufficient assets to pay all projected benefits and expenses when due.

Actuarial Valuation: The determination, as of a valuation date, of the Normal Cost, Actuarial Accrued Liability, Actuarial Value of Assets, and related Actuarial Present Values for a plan. An Actuarial Valuation for a governmental retirement system typically also includes calculations of items needed for compliance with GASB, such as the ADC and the NPL.

Actuarial Value of Assets: The value of the Fund's assets as of a given date, used by the actuary for valuation purposes. This may be the market or fair value of plan assets, but commonly plans use a smoothed value in order to reduce the year-to-year volatility of calculated results, such as the funded ratio and the ADC.

Actuarially Determined: Values that have been determined utilizing the principles of actuarial science. An actuarially determined value is derived by application of the appropriate actuarial assumptions to specified values determined by provisions of the law.

Actuarially Determined Contribution (ADC): The employer's periodic required contributions, expressed as a dollar amount or a percentage of covered plan compensation. The ADC consists of the Employer Normal Cost and the Amortization Payment.

Amortization Method: A method for determining the Amortization Payment. The most common methods used are level dollar and level percentage of payroll. Under the Level Dollar method, the Amortization Payment is one of a stream of payments, all equal, whose Actuarial Present Value is equal to the UAAL. Under the Level Percentage of Pay method, the Amortization Payment is one of a stream of increasing payments, whose Actuarial Present Value is equal to the UAAL. Under the Level Percentage of Pay method, the stream of payments increases at the assumed rate at which total covered payroll of all active members will increase.

Glossary

Amortization Payment: The portion of the pension plan contribution, or ADC, that is designed to pay interest on and to amortize the Unfunded Actuarial Accrued Liability.

Assumptions or Actuarial Assumptions: The estimates on which the cost of the Fund is calculated including:

(a) Investment return - the rate of investment yield that the Fund will earn over the long-term future;

(b) Mortality rates - the death rates of employees and pensioners; life expectancy is based on these rates;

(c) Retirement rates - the rate or probability of retirement at a given age;

(d) Turnover rates - the rates at which employees of various ages are expected to leave employment for reasons other than death, disability, or retirement;

(e) Salary increase rates - the rates of salary increase due to inflation and productivity growth

Closed Amortization Period: A specific number of years that is counted down by one each year, and therefore declines to zero with the passage of time. For example, if the amortization period is initially set at 30 years, it is 29 years at the end of one year, 28 years at the end of two years, etc. See Funding Period and Open Amortization Period.

Decrements: Those causes/events due to which a member's status (active-inactive-retiree-beneficiary) changes, that is: death, retirement, disability, or termination.

Defined Benefit Plan: A retirement plan in which benefits are defined by a formula applied to the member's compensation and/or years of service.

Defined Contribution Plan: A retirement plan, such as a 401(k) plan, a 403(b) plan, or a 457 plan, in which the contributions to the plan are assigned to an account for each member, the plan's earnings are allocated to each account, and each member's benefits are a direct function of the account balance.

Employer Normal Cost: The portion of the Normal Cost to be paid by the employers. This is equal to the Normal Cost less expected member contributions.

Glossary

Experience Study: A periodic review and analysis of the actual experience of the Fund that may lead to a revision of one or more actuarial assumptions. Actual rates of decrement and salary increases are compared to the actuarially assumed values and modified as deemed appropriate by the Actuary.

Funded Ratio: The ratio of the actuarial value of assets (AVA) to the actuarial accrued liability (AAL). Plans sometimes calculate a market funded ratio, using the market value of assets (MVA), rather than the AVA.

Funding Period or Amortization Period: The term "Funding Period" is used in two ways. First, it is the period used in calculating the Amortization Payment as a component of the ADC. Second, it is a calculated item: the number of years in the future that will theoretically be required to amortize (i.e., pay off or eliminate) the Unfunded Actuarial Accrued Liability, based on the statutory employer contribution rate, and assuming no future actuarial gains or losses.

GASB: Governmental Accounting Standards Board.

GASB 67 and GASB 68: Governmental Accounting Standards Board Statements No. 67 and No. 68. These are the governmental accounting standards that set the accounting rules for public retirement systems and the employers that sponsor or contribute to them. Statement No. 68 sets the accounting rules for the employers that sponsor or contribute to public retirement systems, while Statement No. 67 sets the rules for the systems themselves.

Investment Return: The rate of earnings of the Fund from its investments, including interest, dividends and capital gain and loss adjustments, computed as a percentage of the average value of the fund. For actuarial purposes, the investment return often reflects a smoothing of the capital gains and losses to avoid significant swings in the value of assets from one year to the next.

Margin: The difference, whether positive or negative, between the statutory employer contribution rate and the Actuarially Determined Contribution (ADC) as defined by GASB.

Net Pension Liability: The Net Pension Liability is equal to Total Pension Liability minus Plan Fiduciary Net Position.

Glossary

Normal Cost: That portion of the Actuarial Present Value of pension plan benefits and expenses allocated to a valuation year by the Actuarial Cost Method. Any payment in respect of an Unfunded Actuarial Accrued Liability is not part of Normal Cost (see Amortization Payment). For pension plan benefits that are provided in part by employee contributions, Normal Cost refers to the total of employee contributions and employer Normal Cost unless otherwise specifically stated. Under the entry age normal cost method, the Normal Cost is intended to be the level cost (when expressed as a percentage of pay) needed to fund the benefits of a member from hire until ultimate termination, death, disability, or retirement.

Plan Fiduciary Net Position: Market value of assets.

Total Pension Liability: The actuarial accrued liability based on the blended discount rate as described in GASB 67/68.

Unfunded Actuarial Accrued Liability: The excess of the Actuarial Accrued Liability over the Actuarial Value of Assets. This value may be negative in which case it may be expressed as a negative Unfunded Actuarial Accrued Liability, also called the Funding Surplus.

Valuation Date or Actuarial Valuation Date: The date as of which the value of assets is determined and as of which the Actuarial Present Value of Future Plan Benefits is determined. The expected benefits to be paid in the future are discounted to this date.

Questions?

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